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# Economic Impact of Pollution Control Regulations on Steel Plants in the Mahoning River Valley

Booz-Allen and Hamilton, Inc.

Prepared For
Environmental Protection Agency

April 28, 1976

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This study analyzes whether (1) the return on investment from continued operation of eight steel plants in the Mahoning Valley of Ohio is sufficient to justify the investment in pollution controls required and (2) the firms would be able to raise sufficient capital to provide pollution control equipment for these plants in the context of the total capital requirements of the firms.

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FINAL REPORT

# ECONOMIC IMPACT OF POLLUTION CONTROL REGULATIONS ON STEEL PLANTS IN THE MAHONING RIVER VALLEY

An Evaluation of Financial and Economic Data
Submitted by the United States Steel Corporation,
Youngstown Sheet and Tube Company, and
The Republic Steel Corporation

U.S. ENVIRONMENTAL PROTECTION AGENCY

Washington, D.C.

April 28, 1976

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April 28, 1976

Mr. A. M. Brueckmann, Chief
Industrial Analysis Branch
Economic Analysis Division
U. S. Environmental Protection Agency
401 M Street, S. W.
Washington, D. C.

Dear Mr. Brueckmann:

We are pleased to submit our final report on the financial impact of the costs of meeting pollution control requirements on selected steel-making facilities in the Mahoning River Valley of Ohio.

It has been a distinct pleasure working with the staff of the Economic Analysis Division on this assignment.

Very truly yours,

Booz, Allen & Hamilton Inc.

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## PREFACE *

The U. S. Environmental Protection Agency promulgated the Phase I Effluent Guidelines (covering steelmaking operations) for the iron and steel industry in June 1974. At that time the preamble to these regulations stated that:

> The Agency is aware of the contention that these guidelines may result in large employment reductions in the multi-community Mahoning River Valley region of eastern Ohio .... The information which the Agency has is not sufficient to support different requirements for this area .... Companies contending that the effluent limitations guidelines will cause curtailment of operations and heavy unemployment in the Mahoning Valley area will have the opportunity to present .... information to support this contention. The Agency will analyze this information .... This information will be used to determine whether revision of this regulation for the Mahoning Valley area is appropriate.**

Subsequently, the Agency requested that the steel firms submit detailed information on (1) the prospective costs of meeting pollution

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* Prepared by the U. S. Environmental Protection Agency

** Federal Register, Vol. 39, No. 126, P. 24118

control requirements in the Mahoning Valley and (2) the potential financial impacts of these costs on their operations in the Valley. This information has been provided by the firms and evaluated by the Agency.

EPA was aided in this effort by three consulting firms: (1) Cyrus Wm: Rice Division, NUS Corporation, (2) Battelle, Columbus Laboratories, and (3) Booz, Allen & Hamilton Inc. The first two firms provided assistance in verifying the prospective pollution control cost estimates submitted by the firms. Booz, Allen & Hamilton Inc. aided in the evaluation of the potential financial impacts of these costs. The findings and conclusions of the Booz, Allen financial evaluation are presented in this volume.

It must be emphasized that the conclusions on the potential financial effects of the prospective pollution control costs contained in this volume cannot be translated directly into conclusions on the future viability of steel production in this the Mahoning Valley area. The economics of steel production are affected by too many exogenous factors to permit a direct translation. The analysis in this volume is based upon a set of fundamental assumptions and a given methodology which we believe are appropriate for assessing the potential financial impacts of the regulations upon the plants in the Valley. We believe that generally management would tend to look at such investment

decisions in the same manner. However, the management of these particular plants and the parent corporations may well use a somewhat different methodology and a different set of forecasts (e.g., sales, prices, and profits) in looking at this issue. They may therefore arrive at different conclusions. Furthermore, it is impossible to determine the extent to which non-financial factors may influence management decisions affecting the operations of individual plants. For instance, it is difficult to tell how much weight the individual firms will place on the profitability of their integrated operations as opposed to considering the profitability of these plants on a stand-alone basis. Thus, to repeat, the findings in this analysis cannot be translated directly into conclusions regarding the viability of steel production in the Mahoning Valley area.

EPA has had to weigh two basic concerns in its deliberations on the appropriateness of the application of industry-wide effluent guidelines for the steel operations in the Mahoning Valley: the economic well-being of the people living in the Mahoning Valley area, and the effects of the pollution produced by these steel operations on living conditions in the immediate and neighboring areas. The report in this volume focuses on the former concern. Its objective is to provide the Agency and other interested parties with the information necessary to evaluate the potential impact of the industry-wide effluent guidelines

for iron and steel on the financial viability of the local steel operations, the area's major source of employment and revenue.

The environmental impact of pollution in the immediate and neighboring areas is both visible and well documented. The following brief description of the pollution problem along the Mahoning River is intended to provide a basic overview of the scope of this problem.

The Mahoning River is an Ohio-Pennsylvania interstate stream originating in northeastern Ohio and flowing 96 miles in a general southeasterly direction through Warren and Youngstown before crossing the Pennsylvania state line near Lowellville, Ohio. The river flows another 12 miles in Pennsylvania prior to converging with the Shenango River to form the Beaver River, a tributary of the Ohio River. Because to date only limited efforts have been undertaken to abate pollution in the Valley, both the Mahoning River and the ambient air in an area affecting a significant part of the Valley's population remain substantially polluted.

The lower portion of the Mahoning River downstream from Warren, Ohio are extremely polluted by discharges from eight Ohio municipal sewage treatment plants, an electric power generating station, and a steel manufacturing complex including eight separate facilities, two of which are fully integrated. This pollution is characterized by extreme deoxygenation, high stream temperatures,

substantial amounts of floating oil, high concentrations of ammonia, cyanide, phenolics, various metals, and severe bacterial contamination. All of the Ohio municipal sewage treatment plants along the river are primary facilities, most of which were installed during the early and mid-1960's. Most of the steel plants have only rudimentary waste treatment systems with many discharges virtually uncontrolled. There have been a few significant improvements in industrial waste treatment since the late 1950's and early 1960's when most of the steel plant sanitary wastes were separated from industrial wastes and discharged to municipal sewage systems. At that time direct discharges of spent pickling acids were also eliminated when offsite disposal methods were adopted. While the lower Mahoning River is used only as an industrial water supply in Ohio, the town of Beaver Falls, Pennsylvania, 27 miles from the Ohio-Pennsylvania border, uses the Beaver River as a potable water supply.

The U. S. Army Corps of Engineers operates a series of reservoirs in the Mahoning River basin for flood protection, recreation, and to provide minimum regulated stream-flows necessary for industrial cooling purposes. These minimum winter and summer flow schedules are generally achieved each year for extended periods, although higher flows occur much of the time. At minimum flows, stream temperatures at the State line approach $100^{o}F$ in the summer

and 75°F in the winter during periods of high steel production. Pennsylvania has a 90°F maximum summer standard and a 50°F maximum winter standard. Dissolved oxygen concentrations less than 2 mg/1 (milligrans per liter) occur at many locations in Ohio and values less than 3 mg/1 are common in Pennsylvania. The Ohio and Pennsylvania dissolved oxygen standards are 5 mg/1. Maximum concentrations of cyanide and phenolics in excess of 250 micrograms per liter have been recorded in the Youngstown area and at the state line, while the respective Pennsylvania standards are 25 and 5 micrograms per liter. Ammonia concentrations much in excess of the 1.5 micrograms per liter criteria applied to most Ohio and Pennsylvania warm water fisheries are routinely encountered, and fecal coliform densities reflecting inadequate disinfection of municipal waste are prevalent.

While there has been little improvement in water quality over the last twenty years, the air quality of the region has improved somewhat as a result of emission controls installed at a few of the major steel-making operations. Nevertheless, the primary ambient air standards for the maintenance of health for particulates and sulfur dioxide were not achieved throughout the Valley during 1975, a year of very low steel production. The primary (health-related) ambient air quality standards for total suspended particulates and sulfur dioxide are 75 and 80 micrograms per cubic meter, respectively.* Particulate concentrations

* The particulate standard is stated in terms of the annual geometric mean and the sulfur dioxide standard is stated as the annual arithmetic mean.

measured at fourteen locations in the Warren-Youngstown area ranged from 61 to 133 micrograms per cubic meter in 1975. Average annual concentrations in nine of the fourteen sites exceeded the 75 micrograms per cubic meter standard. Average annual sulfur dioxide concentrations measured at six locations ranged from 31.6 to 84.4 micrograms per cubic meter, with concentrations at one site in Campbell, Ohio exceeding the 80 micrograms per cubic meter standard.

It is against this environmental background in the Mahoning Valley area that the Agency must consider the appropriateness of the industry-wide effluent guidelines for the steel mills in that area.

## INTRODUCTION

This report presents the major findings and conclusions of a study performed by Booz, Allen & Hamilton of the financial impact of Federal and State of Ohio pollution control regulations on a number of steelmaking facilities located in the Mahoning River Valley of Ohio. The facilities covered by the study are owned by the following companies:

- The United States Steel Corporation
- The Youngstown Sheet and Tube Corporation
- The Republic Steel Corporation

Findings and conclusions are based mainly on an evaluation of submissions of financial and economic data by each company to the U.S. Environmental Protection Agency (EPA). The evaluation of each company's submissions was carried out by a Booz, Allen & Hamilton project team of financial analysts and industrial engineers. The data initially submitted by the companies were supplemented by clarifications and additional data provided during extensive discussions with the management of each firm, as well as inspections of the Youngstown area plants involved. In addition, publicly available data, including SEC Form 10-K's, and general industry background information from such sources as the American Iron and Steel

Institute were examined to provide an appropriate perspective for assessing impacts. The study was comprised of the following steps:

- One meeting was held between representatives of each company, an EPA representative, and the Booz, Allen & Hamilton team in order to discuss the methodology employed in developing the data, the sources of the data and the reasonableness of the data submitted as a basis for analysis.

- Visits were made to the facilities of each firm by Booz, Allen & Hamilton personnel and a representative of the EPA. In each case, a thorough inspection of the steelmaking facilities of interest was performed and detailed interviews and discussions were conducted with plant management and operating department heads.

- Follow-up meetings were held with each company to:

  - Discuss findings and conclusions which emerged from the facilities inspections

  - Substantiate and clarify financial and economic data and supporting documentation as required to complete the analysis

- A final meeting with each company was held in which the conclusions of the study were presented and management was given the opportunity to make comments. These comments served to verify the accuracy of findings concerning the physical and financial conditions of the plants concerned. While some small revisions were made as a result, the conclusions remained unaltered and are based solely on the professional judgment of the consultants.

The methodology employed in assessing the impact of pollution control expenditures on the financial performance of the steelmaking facilities included in the study was developed by Booz, Allen & Hamilton and was provided to each company for use in preparing its

initial submission to the EPA. The U.S. Steel Corporation and the Youngstown Sheet and Tube Company prepared and submitted plant-level cash flows using the Booz, Allen & Hamilton methodology and format. The Republic Steel Corporation submitted historical financial data which was used by the consultants as the basis for preparing a series of cash flow analyses. It should be emphasized, therefore, that in each case, the findings and conclusions stated in this report are those of Booz, Allen & Hamilton and do not necessarily reflect the judgments or positions of the managements of the three companies concerned.

Mr. A. M. Brueckmann, Chief, Industrial Analysis Branch, Economic Analysis Division, Office of Planning and Evaluation, was the EPA project monitor for this study.

Throughout the study, the steel companies' managements were cooperative in clarifying data submitted to the EPA and in providing additional data requested by the consultants. Although not every item of information requested by the EPA and Booz, Allen & Hamilton was provided by the companies, it is the consultants' judgment that a sufficient amount of information was provided to complete the required analyses. It must be pointed out, however, that the scope of the study did not provide for an independent audit of financial source data by a

certified auditor. Accordingly, this report should not be construed as implying any certification or attestation with respect to such data.

This report is designed to be studied as a whole. No parts, either text or exhibits, should be viewed other than as an integral part of the complete study.

# I. BACKGROUND TO THE STUDY

This chapter outlines the purpose and scope of the study. It also describes the general methodology employed in the analysis.

## 1. THE PURPOSE OF THE STUDY WAS TO EVALUATE FINANCIAL AND OPERATING DATA SUBMITTED TO THE EPA BY THREE STEEL COMPANIES CONCERNING THE IMPACT OF EFFLUENT GUIDELINE REQUIREMENTS ON THEIR STEELMAKING OPERATIONS IN THE MAHONING VALLEY

This study was initiated on November 22, 1974, the date on which the contract between the EPA and Booz, Allen & Hamilton was finalized. Prior to this, the EPA and Booz, Allen & Hamilton held preliminary meetings with the steel companies concerned in order to discuss the procedures to be used in conducting the study and related data requirements.

At the beginning of the study, certain terms of reference were agreed upon as to the study's purpose, scope, and expected results. These terms of reference are outlined below.

(1) The Objective of the Assignment Was to Determine Whether the Required Pollution Control Investment Could be Justified on a Financial Basis*

The integrated steel plants in the Mahoning River Valley of Ohio (Youngstown/Warren area) are considered to be among the least economically viable in the domestic steel industry. They are disadvantaged by both relatively obsolete equipment and their location. Because of their condition, the possibility exists that the impact of initial capital outlays and annual operating costs to meet air and water pollution abatement requirements may make their operation financially unjustified. The pollution control requirements of concern are contained in the State of Ohio Implementation Plan for air pollution control and Federal regulations for the control of effluents from industrial point sources.**

* The concept of financial "justification" for an investment, as used in the study, requires that the expected return on a prospective investment must be greater than the cost to the company of the capital required to make the investment.

** The State of Ohio Implementation Plan was submitted in 1972 and approved with certain exceptions on April 15, 1974 (see 39 FR 13539, 40 CFR 52, 1870). References to Federal pollution control regulations in these working papers, unless otherwise noted, refer also to these State regulations which stem from Federal requirements. Effluent guidelines and standards for iron and steel manufacturing were promulgated by EPA on June 28, 1974, effective one month later (see 39 FR 24114, 40 CFR 420). Additional proposed regulations covering hot forming and cold finishing were published in the Federal Register on August 21, 1975 (see 40 FR 36708). The water pollution regulations for iron and steel manufacturing promulgated by EPA on June 28, 1974 were used by the companies as the basis for developing the pollution control cost estimates used in this study. Because the proposed regulations for the finishing processes were not yet promulgated at the start of this study, the companies used the Contractors Draft Report dated July, 1974, to determine the equipment requirements and estimated costs of compliance with anticipated effluent limitations on the forming and finishing operations.

In mid-1974, four firms--United States Steel Corporation, Youngstown Sheet and Tube Company, Republic Steel Corporation, and Copperweld Corporation*--which together operate nine plants in the Mahoning Valley area indicated that enforcement of the proposed 1977 and 1983 industry-wide effluent guidelines could result in adverse economic and employment consequences to the steel producing segment of the area economy.**

*The Copperweld Corporation, which was a party to the initial discussions, did not become a subject of the impact study. The Copperweld Corporation notified the EPA Administrator in a letter dated December 30, 1974, that the Corporation "intends to comply with the spirit and intent of the law and will fully cooperate with the Federal and State agencies." The letter also requested that restrictions placed on Copperweld "be no more stringent than those placed upon its competitors." In view of the above, EPA determined that it was not necessary to include the Copperweld facility in the study.

**A formal request for amendments to these regulations as they apply in the Youngstown area was filed with the EPA in a letter dated September 24, 1974, to Russell E. Train, EPA Administrator, from the Western Reserve Economic Development Agency on behalf of itself, the Eastgate Development and Transportation Agency, the City of Youngstown, the City of Warren, and the City of Niles, Ohio. Although none of the four companies is a formal party to the WREDA request, some or all of them have in various proceedings, both formal and informal, expressed concern over the impact of effluent and water quality regulations on the Mahoning Valley Economy, and have urged that consideration be given to this factor in setting standards. The companies are also co-petitioners with the AISI and 20 other steel producers in an action filed with the Third Circuit Court of Appeals which resulted in the effluent limitations guidelines for the steelmaking segment promulgated on June 28, 1974, being remanded to the EPA for further development.

The EPA, in promulgating the effluent guidelines, acknowledged that it was "aware of the contention that these guidelines may result in large employment reductions in the multi-community Mahoning River Valley region." The agency also indicated that an economic impact analysis would be undertaken.

A number of previous assessments* of the economic impact of air and water pollution abatement requirements on the domestic steel industry have indicated that capital access may pose a significant industry-wide constraint to meeting requirements for pollution abatement, equipment replacement and modernization, and capacity expansion. Up to the present, however, detailed plant-level economic impact assessments have been impractical because the specific information needed to make such assessments has not been available. In August 1974, the EPA requested that the producers named above provide detailed financial and operating data regarding their

*For example, Booz, Allen & Hamilton Inc., "Study of the Economic Impact on the Steel Industry of the Costs of Meeting Federal Air and Water Pollution Abatement Requirements" (prepared for the Council on Environmental Quality, 1972); Booz, Allen & Hamilton Inc., "Analysis of the Ability of the U.S. Steel Industry to Finance Pollution Control Equipment" (supplement to A.T. Kearney, Inc., "Economic Analysis of the Proposed Effluent Guidelines for the Integrated Iron and Steel Industry," prepared for EPA, 1974); Arthur D. Little, Inc., "Steel and the Environment: A Cost Impact Analysis" (prepared for the American Iron and Steel Institute, 1975); American Iron and Steel Institute, "Steel Industry Economics and Federal Income Tax Policy," 1975.

Mahoning Valley operations to substantiate that adverse economic consequences were probable.

Contingent on receipt of the information requested, the purpose of this study was originally defined as:

> "To assist the EPA in determing whether the information and analyses submitted by the producers substantiate their belief that production curtailments are probable."

During the course of the study, the purpose evolved into the more pointed one of:

> "Determining whether the companies would elect to make the required pollution control investments if only financial factors were considered."

This study has made no attempt to determine an appropriate course of action for the companies confronting the pollution control investment decision at the present time or in the future. The only concern was whether the companies' financial and economic data submissions to the EPA and supplementary data* substantiate that investments representing

*Data submitted by the companies included: historical operating data for the plants at issue, capital investment records, tables of equipment and facilities, and detailed pollution control cost estimates. Supplementary data included detailed information on product lines and raw materials sources and costs.

full compliance with existing Federal regulations would have such severe adverse economic consequences on their facilities in the Mahoning River Valley that the firms might elect to close the plants rather than make the investments.

(2) The Scope of the Assignment Included the Development of an Economic Impact Assessment Methodology and the Evaluation of the Company Submissions to the EPA

The primary functions performed by the consultants during the assignment included the development of an economic impact assessment methodology, the evaluation of the economic and operating data submitted by the steel companies to the EPA, and the development of conclusions regarding the economic consequences of a decision to make the required pollution control investments in the facilities of interest.

During the study, the consultants made certain adjustments to the data submitted in order to provide a more meaningful analysis, and, as far as possible, to provide a common basis for analysis.* In all cases, the adjustments made were fully

*Several types of adjustments were made. For example, transfer prices were adjusted to reflect market prices rather than cost-based prices (see Section 2 of this chapter). Also, appropriate inventory adjustments were made to reflect only production activity in a plant's operating results.

discussed with the companies. Accordingly, while the conclusions developed do not necessarily reflect the judgments of the companies' managements, they are thoroughly conversant with the bases for the conclusions.

## 2. THE FINANCIAL ANALYSIS WAS BASED UPON AN ASSESSMENT OF THE IMPACT OF VALIDATED POLLUTION CONTROL COSTS ON FACILITY CASH FLOWS

The methodology employed in conducting the financial analysis focused on determining the effects of validated pollution control costs on the long-term cash flow anticipated from each facility in question. In a second and no less important step, an assessment of the ability of the affected companies to obtain the capital needed for pollution control investment was made.

### (1) Cash Flow Provides the True Measure of Financial Performance

The term "cash flow" indicates the volume of cash generated by an operation over a given period of time. It is differentiated from "profit" in that cash inflows and outflows are recorded as they occur and noncash expenses such as depreciation of equipment are excluded, except as they bear on taxes payable. Cash flow provides the true measure of financial performance in that the accounting conventions bearing on the calculation of profit are removed and the

focus is placed on the generation of the cash resources needed to obtain materials and equipment to maintain operations and to pay dividends to shareholders. It is also the basic financial performance measure most commonly advocated by both the financial and academic communities.

(2) Pollution Control Cost Estimates Prepared by the Companies Were Independently Validated by the EPA

The pollution control cost estimates submitted by each company to the EPA were pivotal elements in the development of findings and conclusions. Recognizing this, the EPA contracted with independent consultants* to verify the estimates prepared by the companies. In each case, this independent verification has been provided. For two of the companies, the consultants' evaluation of the data resulted in some revisions of the cost estimates. The EPA considers the cost estimates used in this study to be accurate within a range of 10-15%.

(3) The Question of Capital Access Has Also Been Addressed

The cash flow analysis focuses on the profitability of continuing operations while incurring the incremental costs of pollution control. Equally important is the consideration

* The Battelle Memorial Institute (air pollution control costs) and the Cyrus Rice Division of NUS Corp. (water pollution control costs).

of the capacity of the companies concerned to raise the initial funds needed to purchase and install the pollution control equipment. The capital access question has been addressed in this study by considering the current financial position of each company and, to the extent that they can be defined, all company-wide capital investment requirements for pollution control and other purposes, e.g., production equipment replacement, modernization, expansion, etc.

3. THE ECONOMIC IMPACTS OF POLLUTION CONTROL EXPENDITURES ON SPECIFIC FACILITIES WERE ASSESSED ON A "STAND-ALONE" BASIS

At the outset of the study, the EPA and the consultants agreed that it is appropriate to evaluate the economic and financial situation of the Mahoning Valley plants of each firm on a "stand-alone" basis. This premise assumes that the plants "trade" at commercial prices with other units of the company rather than transfer materials at some internally set price.

The supposition under this approach is that under a shutdown or curtailment situation in the Mahoning Valley the companies concerned could either forego the purchase of raw materials and services or realize commercial market prices for disposal of "freed" raw materials produced by other units of the company. The logic underlying this supposition is explained below.

(1) Steelmaking Operations in All Three Companies Are Integrated to Some Extent Including Both Coal and Ore Production and Intra-Company "Trading" of Steel Products

Steel companies in the U.S. generally obtain most of their raw materials from captive sources:

- About 75% of the industry's domestic and foreign iron ore receipts come from captive mining operations. (Before nationalization of Venezuelan mines in 1974, this figure was about 85% to 90%.)
- In 1973, the last year for which figures are available, the industry produced 66% of the coal it consumed.

Exhibit I, following this page, indicates the relative dependence of each of the three companies of concern on captive supplies of coal and iron ore. As can be seen, each of the three companies must purchase at least a portion of its coal and iron ore requirements from external sources. Were raw materials consumption in the Mahoning Valley facilities to be reduced, a proportional reduction in external raw materials purchases could be made, thus eliminating the out-of-pocket cost implied by the market price of these materials. Conversely, to the extent that a reduction in raw materials consumption would reduce the need for captively produced supplies, those supplies could be freed for sale on the open market, thus

EXHIBIT I

Environmental Protection Agency

COMPANY DEPENDENCE ON CAPTIVE SUPPLIES OF RAW MATERIALS (1974)

| | United States Steel Corporation | Youngstown Sheet and Tube Company | Republic Steel Corporation |
|---|---|---|---|
| Coal | 66% | 64% | 45% |
| Ore | 75%+ | 93% | 71% |

Source: 1974 SEC Form 10-K for the Republic Steel Corporation and the Youngstown Sheet & Tube Company. The coal estimate for the United States Steel Corporation was supplied by the company. The iron ore estimate was developed by Booz, Allen & Hamilton and reflects the nationalization of Venezuelan ore sources.

providing the opportunity to generate the level of revenue and profit for the company implicit in the market price.

For the three companies of concern in this study the dominant effect of an operations curtailment would be a reduction in external purchases of raw materials (see Exhibit I). For U.S. Steel and Republic Steel the potential reduction in external raw materials purchases, were the facilities in question to be shut down, represents less than the percentage of materials requirements currently met by external sources. For Youngstown Sheet and Tube, a combination of reduction in outside materials purchases and open market role of freed materials would apply. The issue of market absorbtion of freed materials and pricing is discussed subsequently.

The pricing of steel products which are consumed in other company plants at their market value rather than at some internally set transfer price, with due regard for impacts on other company operations, is designed to place the appropriate share of the profits generated by the sale of such products in their final forms with the proper producing units of the company.

In considering the intercompany trading of products within the framework of the "Stand-Alone" approach, care

must be taken to assess the interdependencies of the facilities in question with other producing units of the companies concerned. These interdependencies were assessed and in each case it was concluded that the companies could adjust their other operations to eliminate such dependencies without excessive cost, were the facilities in question to be shut down.

(2) The Market Prices Established for Raw Materials Reflected Mid-1974 Levels

During the period 1973-1975, prices for metallurgical grade coal increased dramatically. In order to determine whether these increases reflected a temporary phenomenon or a basic restructuring of supply/demand relationships a special analysis of the worldwide market for metallurgical grade coal was undertaken. The results of this analysis indicated that the long-term outlook was for continued growing worldwide demand for a limited market supply (constrained by both lead time required to develop reserves and environmental considerations) of metallurgical grade coal for steelmaking and for other uses. Accordingly, it was concluded that mid-1974 price levels, high though they were, would be representative of the market

outlook.* It should be noted that the world market perspective is appropriate as the U.S. is a major exporter of metallurgical grade coal.

The market price for iron ore also rose during the same period reflecting both strong demand and the threat of nationalization of foreign iron ore holdings. (The U.S. is a major importer of iron ore.) Mid-1974 iron ore prices were also considered to be compatible with the long-term world market outlook for iron ore. While iron ore prices may be expected to fluctuate as world steel production fluctuates, the long-term trend should be upward, reflecting anticipated long-term growth in steel consumption.

The quantities of iron ore and metallurgical grade coal potentially released to the world market by the closure of all of the steelmaking facilities in question represent only a fraction of 1% of annual world production. Given continued

*Even with the slackened demand for coking coals during the depressed level of steel production in 1975, coal prices registered small increases during the year. According to Bureau of Labor Statistics indexes, high- and low-volatile metallurgical grade coal prices rose 5% and less than 1%, respectively, during 1975. The 1975 average-month price of both varieties of coal was 23% above the summer (August) 1974 level.

growth in world consumption of both materials the release of these quantities should have no noticeable depressing effect on long-term market prices. The market should also, of course, be capable of readily absorbing the quantities released for sale.

(3) Finished and Semi-Finished Product Commercial Prices Are More Difficult To Determine Than Those of Raw Materials and Are Normally Established by Treating the Receiving Unit as an Independent Customer

In many steel companies, a substantial amount of intra-company shipment of semi-finished products (for further processing) and finished steel (for fabrication) takes place to achieve optimum utilization of facilities. "Bulk" markets reflecting a market price for some of these products do not exist in the way they do for raw materials. In such cases, a market price can be established based upon prices of comparable materials sold by the company to public customers.

In some instances, for example, where a final product is transferred to a sales or distribution company, a "net realization" approach, which reflects the net revenue attributable to the producing unit, may be a more appropriate means of establishing a market price.

(4) The "Stand-Alone" Basis for Analysis Is Appropriate

The adoption of a "Stand-Alone" basis for assessing the economic impact of pollution control expenditures on the steelmaking facilities of interest is appropriate both as a theoretical and as a practical matter. The "Stand-Alone" basis, as indicated by the preceding discussion, is designed to produce a complete picture of the effects of the operation of the facilities in question on the cash flow of the companies which own them.

(5) While the Basis of the Evaluation Is a "Stand-Alone" Approach, the Selective Use of Data on an "Integrated" Basis is Useful Where a Particular Facility Represents a Substantial Proportion of a Company's Operations

The extent and type of integration of each company's Mahoning Valley operations into the parent corporation takes various forms. For example:

- U.S. Steel's Youngstown Works lacks coking facilities and must obtain coke from other sources.
- The Youngstown Sheet and Tube Company makes a proportion of its sales of Youngstown District products through an affiliated oil field equipment company.
- Republic Steel has several units which further process products made in the Mahoning Valley District.

In addition, the plants under study represent different levels of importance to the steel operations of each company. In one case the output is under 5% of the company total, in another it is about 25% and in the third, approximately 45%.

Because the Mahoning Valley facilities of Youngstown Sheet and Tube and Republic Steel represent a significant proportion of their total steel capacity, supplementary analyses were performed on an integrated basis to provide insights into the economic consequences of pollution control expenditures when viewed from this perspective. While such an analysis presents an inaccurate picture of the true economic choices to be made, it does provide useful information regarding the situation confronting these companies were the choice made to consider only the direct out-of-pocket costs of continuing operations while ignoring the real economic costs involved.

The integrated basis presumes that a choice has been made to keep a facility in operation as long as the direct revenues produced by that facility, after considering out-of-pocket operating cost, produce sufficient cash flow to make continuing operations feasible. Implicit in such a choice is the decision not to maximize the long-term earnings of the company. Such a decision in turn would have to be based on noneconomic considerations.

4. AN "AVERAGE CASE" AND A "BEST CASE" APPROACH WAS EMPLOYED IN ASSESSING THE LONG-TERM CASH FLOW ANTICIPATED FROM EACH STEELMAKING FACILITY OF INTEREST

The bases adopted for the cases were:

- "Average Case"--Average 1970-1974 financial performance
- "Best Case"--1974 financial performance

For Republic Steel and Youngstown Sheet and Tube, both "Average" and "Best" case analyses were prepared. For U. S. Steel the preparation of an "Average Case" analysis was not necessary as conclusions could be adequately drawn from the "Best Case" analysis.

The logic of using "Best Case" and "Average Case" performance scenarios and the reasons for selecting the above base points are explained below.

(1) In the Period 1970 - 1974, the Steel Industry Experienced a Cycle of Profitability That Can Be Considered as Representative of "Average" Performance

As shown in Exhibit II, following this page, average steel industry profits, both as a percent of revenue and of stockholders' equity during the past five years were comparable to average performance over the past 10-20 years.

EXHIBIT II

U. S. Environmental Protection Agency

UNITED STATES STEEL INDUSTRY PROFITS
AFTER TAXES AS A PERCENT OF REVENUES
AND OF STOCKHOLDERS' EQUITY

| | Millions of Dollars | Percent of Revenues | Percent of Stockholders' Equity* |
|---|---|---|---|
| 1955 | 1,099 | 7.8% | 15.4% |
| 1956 | 1,113 | 7.3 | 14.1 |
| 1957 | 1,132 | 7.3 | 13.1 |
| 1958 | 788 | 6.3 | 8.3 |
| 1959 | 831 | 5.8 | 8.4 |
| 1960 | 811 | 5.7 | 7.9 |
| 1961 | 690 | 5.2 | 6.5 |
| 1962 | 566 | 4.1 | 5.3 |
| 1963 | 782 | 5.4 | 7.3 |
| 1964 | 992 | 6.1 | 9.0 |
| 1965 | 1,069 | 5.9 | 9.4 |
| 1966 | 1,075 | 5.9 | 8.9 |
| 1967 | 830 | 4.9 | 6.9 |
| 1968 | 992 | 5.3 | 8.1 |
| 1969 | 879 | 4.6 | 7.0 |
| 1970 | 532 | 2.8 | 4.1 |
| 1971 | 563 | 2.8 | 4.3 |
| 1972 | 775 | 3.4 | 5.8 |
| 1973 | 1,272 | 4.4 | 9.3 |
| 1974 | 2,481 | 6.4 | 17.1 |

| | Avg. | Range | Avg. | Range |
|---|---|---|---|---|
| 1955-1974 | 5.4 | 2.8-7.8 | 8.8 | 4.1-17.1 |
| 1960-1974 | 4.9 | 2.8-6.4 | 8.1 | 4.1-17.1 |
| 1965-1974 | 4.6 | 2.8-6.4 | 8.1 | 4.1-17.1 |
| 1970-1974 | 4.0 | 2.8-6.4 | 8.1 | 4.1-17.1 |

* Based on equity at beginning of year.

Source: American Iron and Steel Institute

(2) In 1974 the Steel Industry Achieved a Level of Profitability Unsurpassed Since 1957

In absolute terms, steel industry profits in 1974 of $2.5 billion set a record as shown in Exhibit II. Profitability in 1974, as measured by return on sales, was the highest since 1957 and in terms of return on equity, the highest in the period shown in Exhibit II.

It should be noted that the industry's performance in comparison to all domestic manufacturing has rarely been as good as in 1974. In that year, its 17.1% return on equity exceeded the average for all manufacturing for the first time since 1957.

(3) The "Average Case" and "Best Case" Scenarios Provide a Logical Foundation for Assessing the Economic Consequences of Pollution Control Costs on the Steelmaking Facilities of Interest

In assessing the impact of costs to be incurred in the future on the profitability of an enterprise, two immediate issues arise:

- The need for a performance "baseline" against which to measure the impacts of costs to be incurred in the future
- The need to consider the degree to which product price adjustments may be made to offset the added costs

The "Average Case" and "Best Case" scenarios which are discussed above have been adopted as a means of dealing with both of these issues. The "Best" and "Average" Case scenarios represent an historically based range of financial performance possibilities reflecting both the cyclical nature of steel industry performance and the operation of the full range of external conditions and management responses which govern the profitability of the industry, individual companies, and individual steelmaking facilities within companies. The cyclical "spread" of the industry's performance, which is embodied in the average of the five years comprising the "Average Case," as illustrated in Exhibit III, following this page. The industry's high-level performance in 1974 is shown to highlight the comparison between the two cases and their attendant assumptions.

Given the major uncertainties which currently exist regarding future economic conditions, both domestically and worldwide, the use of this type of baseline, i.e., a range based on historical performance, represents both a logical and a prudent approach to analysis.

There is ample evidence that steel industry cost-price relationships are impossible to predict over time with any degree

EXHIBIT III

U. S. Environmental Protection Agency

DOMESTIC STEEL INDUSTRY PERFORMANCE DURING THE "AVERAGE CASE" AND "BEST CASE" PERIODS

| Indicator | Average Case (1970-1974 Average) | | Best Case (1974) |
|---|---|---|---|
| | Range | Average | |
| Net shipments (million tons) | 87.0-111.4 | 98.1 | 109.5 |
| Imports as percent of U.S. steel supply | 12.4%-17.9% | 14.8% | 13.4% |
| Raw steel output (million tons) | 120.4-150.8 | 136.3 | 145.7 |
| Total revenues (billion dollars) | $19.3-$38.5 | $25.9 | $38.5 |
| Price increase (Jan-Dec. change) | 1%-39% | +12% | +39% |
| Net income (billion dollars) | $0.5-$2.5 | $1.1 | $2.5 |
| Net income as percent of revenues | 2.8%-6.4% | 4.0% | 6.4% |
| Net income as percent of shareholders' equity | 4.1%-17.1% | 8.1% | 17.1% |

19(a)

of accuracy. Consequently, no attempt at such prediction has been made.

The "Average Case" and "Best Case" scenarios are historically based. Each case assumes that the profits actually achieved by the facilities in question during the period selected represented the highest that could be obtained, all things considered. Thus, the "Average" and "Best" case scenarios reflect a range of assumed maximum profit possibilities under varying external economic conditions. Another important implicit assumption is that in each case the producers were getting the best price for their products that they could obtain, all factors considered. That better prices could not be obtained is assumed to be demonstrated by the fact that they were not obtained. The corollary to the above is that had production cost been higher, reflecting any pollution control costs, then profits at any point in the range would have been proportionately lower.

The premises used to deal with the pricing issue in this study are the following:

- That prices for steel products are established largely on an industry-wide basis according to a pattern of price leadership by the major producers.
- That the pricing of steel products produced by the plants of interest will continue to follow the

industry-wide pattern. (Independent price increases by the facilities in question would be infeasible as they are literally surrounded by more modern competing facilities which could undersell them if they attempted to price at a premium.)

- That pricing decisions reflect average cost/profit objectives and market conditions for particular product lines; consequently, "high cost" plants producing particular products will continue to face low profit margins due to competitive pressure from low cost facilities.

The question of pricing, as reflected by the above premises, is not the degree to which the facilities in question will raise prices, as the facilities are pricing followers, but rather how industry-wide prices for the products in question can be expected to behave in relation to production costs.

Accordingly, the "Average" and "Best" Case scenarios may be viewed as representing a range of maximum profit possibilities under varying external economic conditions with added costs reducing the profit potential at any point within the range.

* * * *

This chapter has reviewed the purpose and scope of this study and has described the general methodology used in the analysis. The next chapter discusses the recent performance of the U. S. steel industry, concerns of steelmakers, and the industry's outlook.

## II. THE STEEL INDUSTRY OUTLOOK

This chapter reviews recent performance of the domestic steel industry, current concerns of steel producers, and the outlook for capacity expansion.

### 1. 1973 AND 1974 SHOWED SUBSTANTIAL IMPROVEMENT IN STEEL INDUSTRY RESULTS OVER PRECEDING YEARS, BUT 1975 PRODUCED THE LOWEST OUTPUT SINCE 1963

The economic environment for domestic steel producers was highly advantageous in 1973 and 1974, but performance in 1975 introduced uncertainty into the outlook for future performance and capacity expansion.

#### (1) In 1973 and 1974, the Domestic Steel Industry Achieved Record Levels of Output With Profitability the Highest Since 1957

The industry achieved record levels of raw steel production and shipments during 1973 and 1974:

- Raw steel output rose 13% over 1972 to a record 151 million tons in 1973, but declined 3% to 146 million tons in 1974.
- Shipments reached an all-time high of 111 million tons in 1973, a 21% increase above the previous year. In 1974, shipments declined about 2% to 109 million tons.

These very high operating levels can be attributed to:

- Increases in domestic steel consumption accompanying the recovery from the 1970-1971 recession
- Decreased availability of steel imports (compared with 1971-1972) reflecting high levels of worldwide steel demand in relation to world production

Increased revenues and record earnings accompanied the rise in output during 1973 and 1974:

- Steel industry sales rose to an all-time high of $38.5 billion in 1974, up 33% over 1973.
- Net income for the steel industry in 1974 reached a record $2.5 billion, largely on the basis of an average 42% rise in steel mill products prices during the year, most of which took place after price controls were lifted in April. These earnings totaled 95% more than the 1973 figure. As a percent of sales, net income rose from 4.5% in 1973 to 6.4% in 1974, the highest since 7.3% was achieved in 1957.
- The steel industry's return-on-net worth in 1974 was 17.5%, ranking ninth in the First National City Bank's survey of 40 manufacturing industries. In 1973, the steel industry's return was 9.8%, according to the survey, ranking 38th.

(2) The Industry's Operating Level and Profits Declined Dramatically During 1975

The industry's operations registered a decline in 1975, reflecting the economic recession.

- Steel consumption dropped about 12% below 1974 levels, reflecting in particular the decreases in auto and consumer appliance manufacturing.
- Domestic steel shipments decreased about 25% from the 1974 level to about 80 million tons, the lowest level since 1963.
- Raw steel production sank about 20% below the 1974 level to 101 million tons.
- Through the third quarter of 1975, revenues of the 18 major steel producers followed by Business Week were averaging 8% below year-earlier levels. For this group of companies profits through the third quarter were 29% below those for the corresponding period in 1974. In the third quarter alone, profits for the group fell 63% below year-earlier levels.*

(3) The Industry Expects To Achieve More Favorable Operating Levels in 1976

Based on evidence of increasing manufacturing activity and strengthening demand for consumers durable goods and capital equipment in the first quarter of 1974, the steel industry anticipates a significant increase in shipments in 1976.

*1975 year-end figures were unavailable in late February 1976.

Estimates for shipments range from 92 to 98 million tons. The expected large increase above the 80 million tons shipped in 1975 is in part due to the much greater than average liquidation of steel product inventories by steel consumers during the past year.

## 2. THE CURRENT CONCERNS OF STEELMAKERS CENTER AROUND THE LEVEL OF DEMAND, POLLUTION CONTROL INVESTMENT AND THE IMBALANCE BETWEEN RAW MATERIAL PRICES AND STEEL SELLING PRICES

While escalating labor costs and energy shortages are of serious concern, these factors are secondary to the problems of low demand, pollution control costs, and the threefold increase in the price of coal from the start of 1974 to the end of 1975.

### (1) Steel Industry Profits Are Highly Sensitive to Volume

The dramatic slide in steel industry profits which has occured during the second half of 1975 reflects to a significant degree the extreme sensitivity of steel industry profits to changes in the volume of steel production and shipments. This sensitivity in turn is based upon the high fixed costs associated with producing steel, i.e., costs which are insensitive to changes in volume of production.

(2) Major Near-Term Capital Outlays Will Be Required To Meet Pollution Control Requirements

Two recent studies provide estimates in 1975 dollars of the large near-term expenditures which will be required for the industry to meet pollution control requirements. A study currently being conducted by the EPA then estimates total capital expenditures remaining to be incurred to meet 1977 and 1983 requirements at $7.0 billion to $9.4 billion.* A 1975 study sponsored by the American Iron and Steel Institute estimated the total investment cost to meet these requirements at $12.2 billion to $14.2 billion.**

The pollution control cost estimates developed in these two studies are based on essentially the same regulatory requirements. The difference between the cost estimates developed is accounted for by differing interpretation of regulatory requirements and costs for equipment, installation, and operations. These differences aside, the point is that the

*Temple, Barker & Sloane, Inc., "Economic Impact of Environmental Regulations on the Iron and Steel Industry" (draft of overview volume submitted to EPA, February 1976)

**Arthur D. Little, Inc., Steel and the Environment: A Cost Impact Analysis, May 1975

capital needs of the industry for pollution control and investment are very large.

A consistent theme among virtually all producers in the industry is apprehension regarding (1) their ability to raise the capital required for pollution control and to meet other operating needs and (2) the impact of pollution control costs on profitability, especially during a period of high general cost inflation and soft demand for steel.

(3) Major Steel Price Increases Have Been Paced by Large Materials and Labor Cost Increases

Exhibit IV, following this page, shows the relationship of steel price increases to increases in prices for purchased coal and iron ore and employment costs over the period 1972 to 1975. The following elements of these relationships deserve special attention:

- Purchased coal prices according to the BLS index increased by 200% between 1972 and 1975. Considering that roughly 33% of the coal consumed in steel production is purchased from outside sources, the out-of-pocket cost increase to producers implied would be about 66%. While the index number for coal is likely to overstate the actual cost increase to steel producers because of the moderating influence of long-term contracts on prices, it should be noted that the increase of 66% noted above assumes no increase in the cost of producing captive coal which accounts for two-thirds of consumption. While data are not available

EXHIBIT IV

U. S. Environmental Protection Agency

CHANGES IN COST AND PRICE LEVELS
FROM 1972 TO 1975

| | Actual 1972 Base | 1974 | March 1975 |
|---|---|---|---|
| Selling Prices | 100 | 143 | 148 |
| Purchased Coal | 100 | 266 | 300 |
| Purchased Ore | 100 | 124 | 159 |
| Employment Costs | 100 | 127 | 142 |

Source: BLS and AISI

regarding captive coal production costs for the industry, it is certain that wage increases and general inflationary pressures during the period in question have caused production costs to increase by a significant amount. The dramatic escalation in purchased coal prices during the 1972 to 1975 period is highlighted in Exhibit V, following this page.

- New long-term coal contracts are subject to price redetermination at annual and less-than-annual intervals which will tend in the future to dilute the price protection afforded by them. The high cost of purchased coal is also significant in terms of its affect on the cost of future incremental steel production where the full cost of coal price increases will be felt. The opportunity cost of producing captive coal for steel production as opposed to sale on the open market could also weigh in decisions regarding the allocation of resources to incremental steel production.

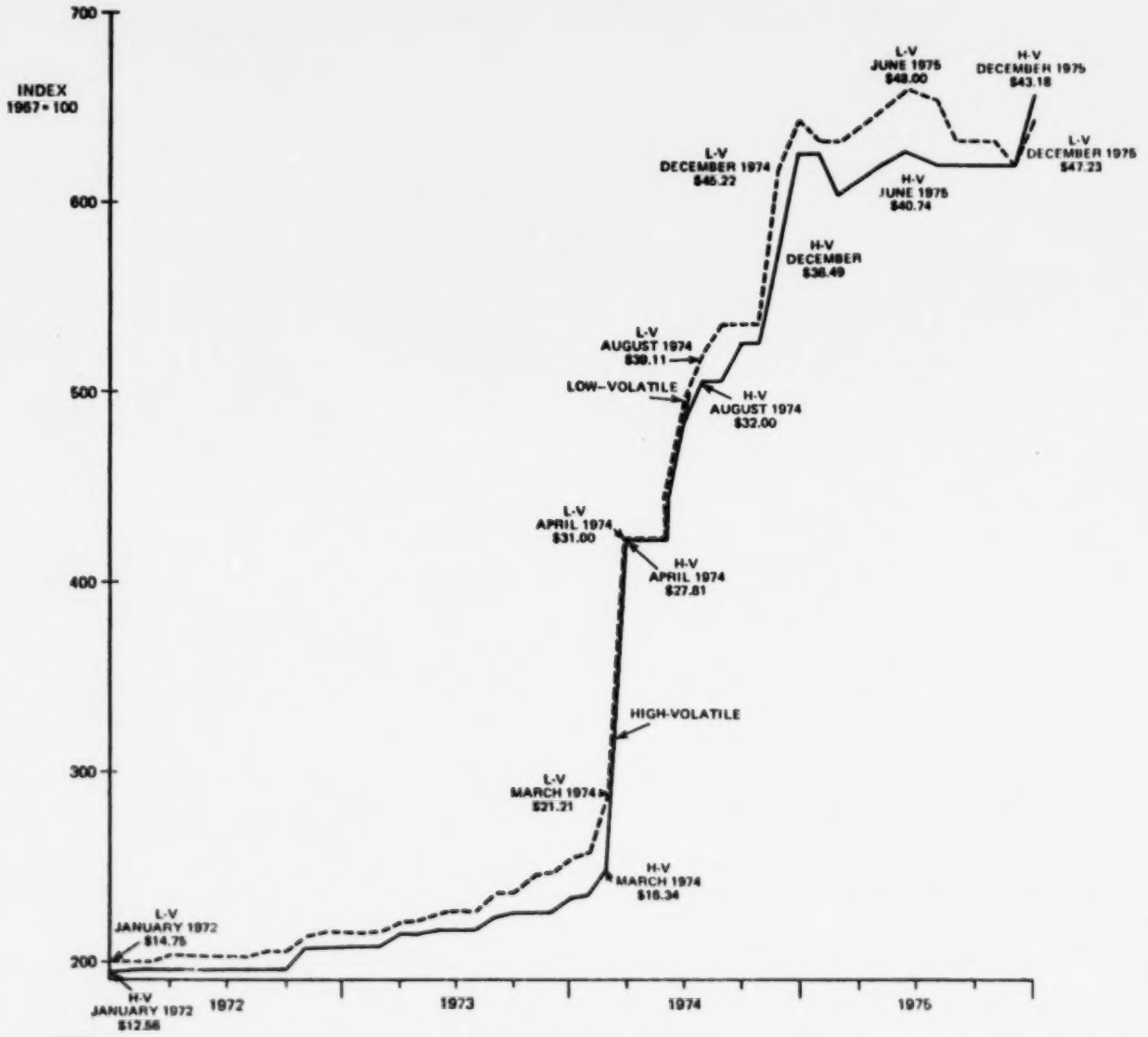
- While the situation with respect to iron ore is much less dramatic than with coal, the escalation in the market price of ore coupled with the industry's increasing dependence on foreign sources would indicate that potential price/cost pressures could be intense in high demand periods especially as regards the production of incremental steel tonnage.

It should be noted that significant raw materials cost inflation is a relatively new phenomenon in the steel industry and one which is likely to continue to place pressure on steel production costs, especially during periods of high production. Thus, inflation is an important variable not only in determining

**EXHIBIT V**

**U. S. Environmental Protection Agency**

**PRICE MOVEMENT OF COKING COAL**
**JANUARY 1972 TO DECEMBER 1975**
**(L-V = Low-Volatile; H-V = High-Volatile)**




SOURCE: U.S. BUREAU OF LABOR STATISTICS, *WHOLESALE PRICES AND PRICE INDEXES*

NOTE: THE PRICE INDEXES SHOWN ARE FOR COAL, F. O. B. MINE. THEY ARE REPRESENTATIVE OF SPOT PRICES RATHER THAN (LOWER) CONTRACT PRICES. THE PRICE QUOTATIONS SHOWN FOR ALL MONTHS, EXCEPT JANUARY 1972, ARE CALCULATED FROM THE CHANGE IN THE INDEX, AS PRICE QUOTATIONS WERE NOT PUBLISHED BEGINNING IN 1974.

current cost/price relationships but also as a determinant of the cost and attractiveness of future incremental steel production.

## 3. DESPITE THE UPWARD TREND IN 1973 AND 1974, THE LONG-TERM OUTLOOK FOR CAPACITY EXPANSION IS UNCERTAIN

While optimism, combined with new, higher forecasts of steel demand, resulted in several announced capacity expansions in 1974 and early 1975 there were indications that eventual installation of this capacity was uncertain. Because the outlook for steel demand in 1976 and beyond is uncertain and because volume is such an important determinant of profitability, there exists significant apprehension among producers regarding the risks of committing large capital outlays in the near term.

### (1) Increased Demand and Industry Profitability Brought a Resurgence of Capacity Expansion Plans in 1974

The robust performance of the industry in 1973 and 1974 encouraged a renewal of capacity expansion programs. By the close of 1975, the industry had announced capacity expansions totaling over 20 million annual tons of raw steel. This compares with a recent industry estimate that 40 million tons of additional raw steel capacity will be needed from the

beginning of 1973 to 1983.* This increment is far in excess of what has been achieved in the postwar period.

- During the 1950's, total industry capital expenditures were $10.3 billion, which included the addition of about 49 million tons of raw steel capacity.
- In the 1960's, 17 million tons of raw steel capacity was added as a portion of total industry capital investment of $16.3 billion. (A large part of this investment was allocated to replacements and modernization, and, toward the end of the decade, to pollution control projects.)
- During the late 1960's and early 1970's capacity expansion was ruled out almost entirely by low earnings levels and increasing debt which limited the industry's access to capital. Also, increasing import penetration left the industry with an excess of capacity.

(2) The Eventual Installation of Announced New Steelmaking Capacity Is Uncertain

Although the domestic steel industry was poised on the threshold of significant capacity expansion at the end of 1974, the magnitude of its capital requirements, the slump in 1975 performance, and possible long-term impact of the current worldwide recession make such expansion uncertain.

Some of the planned additions have been postponed or planned for installation over longer periods of time than

*Arthur D. Little, Inc., op. cit.

originally announced. Depending on the rate of the steel industry's recovery from the economic recession, some previously announced projects may be cancelled.

A recent industry estimate* is that the total outlays to expand, replace, and modernize capacity and to meet pollution abatement requirements through 1983 could be $48 to $50 billion (1975 dollars). This would average about $5.5 billion per year. Of this amount, about $15 billion would be allocated to capacity expansion and $21 billion for replacement. The balance of $12 to $14 billion must be committed for pollution abatement.

The EPA study** now in progress estimates that capacity expansions, replacements, and modernizations will cost about $27.5 billion (1975 dollars) through 1983. Of this total, $15.9 billion would be spent on replacements. Pollution control expenditures would raise the industry's total capital needs to about $36.5 billion, according to the EPA study. Using this total, the industry would require capital at the rate of about $4 billion per year.

*Arthur D. Little, Inc., op. cit.
**Temple, Barker & Sloane, Inc., op. cit.

Even if industry profitability were to remain at or exceed 1974 levels, it is uncertain that the capital necessary to make these expenditures will be available. In 1974, industry capital expenditures amounted to $2.1 billion, a 50% increase over 1973, but still less than half the average investment level projected for the future. Capital outlays at the 1974 level will have to be exceeded to both satisfy demand through capacity expansion and to comply with pollution control requirements. Such expenditures could be put out of the question for either of the following reasons:

- A decline in profitability stemming from a prolonged economic slump and falling output which, in the short term, would reduce demand and capacity needs. 1975 results reflect such a downturn in profitability.

- Continued rapid increases in capital and operating costs without offsetting price increases (the net result of unchecked inflation being a slump in demand and output since demand is not totally inelastic to price).

The industry's access to capital, though probably improved (temporarily) with gains in profitability during the previous two years, may well be inadequate in view of the sums required.

* * * *

## III. STEELMAKING IN THE MAHONING RIVER VALLEY

This chapter presents an overview of the characteristics of the Mahoning River Valley from a steelmaking viewpoint, in particular concerning its importance in the local economy and some of the physical and geographical characteristics which the area exhibits.

### 1. THE STEEL INDUSTRY IS THE MAHONING RIVER VALLEY'S MAJOR INDUSTRIAL ACTIVITY

Located approximately 60 miles northwest of Pittsburgh and 60 miles southeast of Cleveland, the City of Youngstown is the focal point of the Mahoning River Valley region. It is the seventh largest city in Ohio with a population between 130 and 140 thousand. The population of the region (Mahoning and Trumbull Counties) is about 550 thousand.

Steel manufacturing and processing leads all other industries in terms of its direct and indirect economic importance to the area.

#### (1) The Steel Industry Is the Largest Employer in the Youngstown-Warren Area

In terms of jobs and payroll, the steel industry employs more people and provides more wages than any other industry

in the Youngstown-Warren area (consisting of Mahoning and Trumbull Counties). As shown below in data for 1973, the last year for which data are available, the industry accounted for:

- 15% of total employment
- 20% of total payroll

| Industrial Sector (SIC Code) | No. of Jobs* (Thousands) | Taxable Payroll** ($ Millions) |
|---|---|---|
| Total | 178 | 390 |
| Agriculture | 1 | 1 |
| Mining | 1 | 1 |
| Construction | 7 | 20 |
| Manufacturing | 89 | 246 |
| Steel (SIC 331) | 27 | 80 |
| Transportation/Utilities | 8 | 21 |
| Wholesale Trade | 8 | 18 |
| Retail Trade | 34 | 39 |
| Finance/Insurance/ Real Estate | 6 | 11 |
| Services | 25 | 34 |

* Mid-March, 1973

** First quarter, 1973 Total

Source: U.S. Bureau of the Census, County Business Patterns, Ohio, 1973

(2) The Steel Industry Generates Important Secondary Economic Benefits in the Area

The industry's economic importance is reflected in terms of its secondary impacts--jobs and tax payments--as well as its direct employment. In 1972, according to a study conducted for the local economic development agency,* the industry, with its own payroll of $271 million, also:

- Purchased $90 million in goods and services from the local economy, supporting an additional 3,300 jobs with a total payroll of about $31 million
- Generated from 19% to 27% of the area's 201,500 non-farm jobs and a similar proportion of the $142 million in total tax revenues of local jurisdictions

2. STEELMAKING IN THE MAHONING RIVER VALLEY PROVIDES ROUGHLY 5% OF U.S. RAW STEEL CAPACITY AND DATES BACK TO BEFORE 1900

Steelmaking facilities in the Youngstown, Ohio region of the Mahoning River Valley comprise roughly 5% of domestic raw steel capacity. These plants include some of the oldest steelmaking facilities still in use in the United States. The first steel plants were installed near the turn of the century when Pittsburgh and Cleveland were the nation's leading industrial cities. The plants in the area,

*Ernst & Ernst, Economic Impact of Water Pollution Controls on the Mahoning River Valley, prepared for the Western Reserve Economic Development Agency, August 1973.

which are integrated and semi-integrated, produce mainly hot and cold rolled sheet and strip, bars, pipe, and tubing.

## 3. THE YOUNGSTOWN AREA IS ECONOMICALLY DISADVANTAGED BY A NUMBER OF LOCATIONAL CHARACTERISTICS

The Mahoning River Valley is at a disadvantage compared with some other steelmaking centers because of the cumulative effect of:

- The movement of markets away from Youngstown
- Somewhat constrained access to raw materials due to relatively poor rail connections and no access to deep water ports
- Considerable transportation of products between plants within the District

Taken together, these factors somewhat undermine the competitive position of the District.

### (1) The Mahoning Valley Steel Plants Are Unfavorably Located in Relation to Some Existing Steel Markets

Since World War II, the rapid development of new or modernized steelmaking facilities to the north of the Mahoning Valley along the Great Lakes, to the east in Pennsylvania, and to the south in Alabama and Texas has put the area at a relative disadvantage with respect to customer service and shipment costs. For example, the transportation cost advantage of shipping from

a Youngstown mill is only significant within a 30-mile radius of the city. Customers beyond that shipping distance can be served at competitive transportation cost levels from other steel plants located in the eastern and midwestern regions of the United States. Exhibit VI, following this page, shows the relationship of the Mahoning Valley to other mills and eastern and midwestern production centers. In addition, the growth of domestic steel consumption in the southeast, southwest, and west has effectively precluded access to some significant new markets because of unfavorable time, distance, and transportation cost relationships.

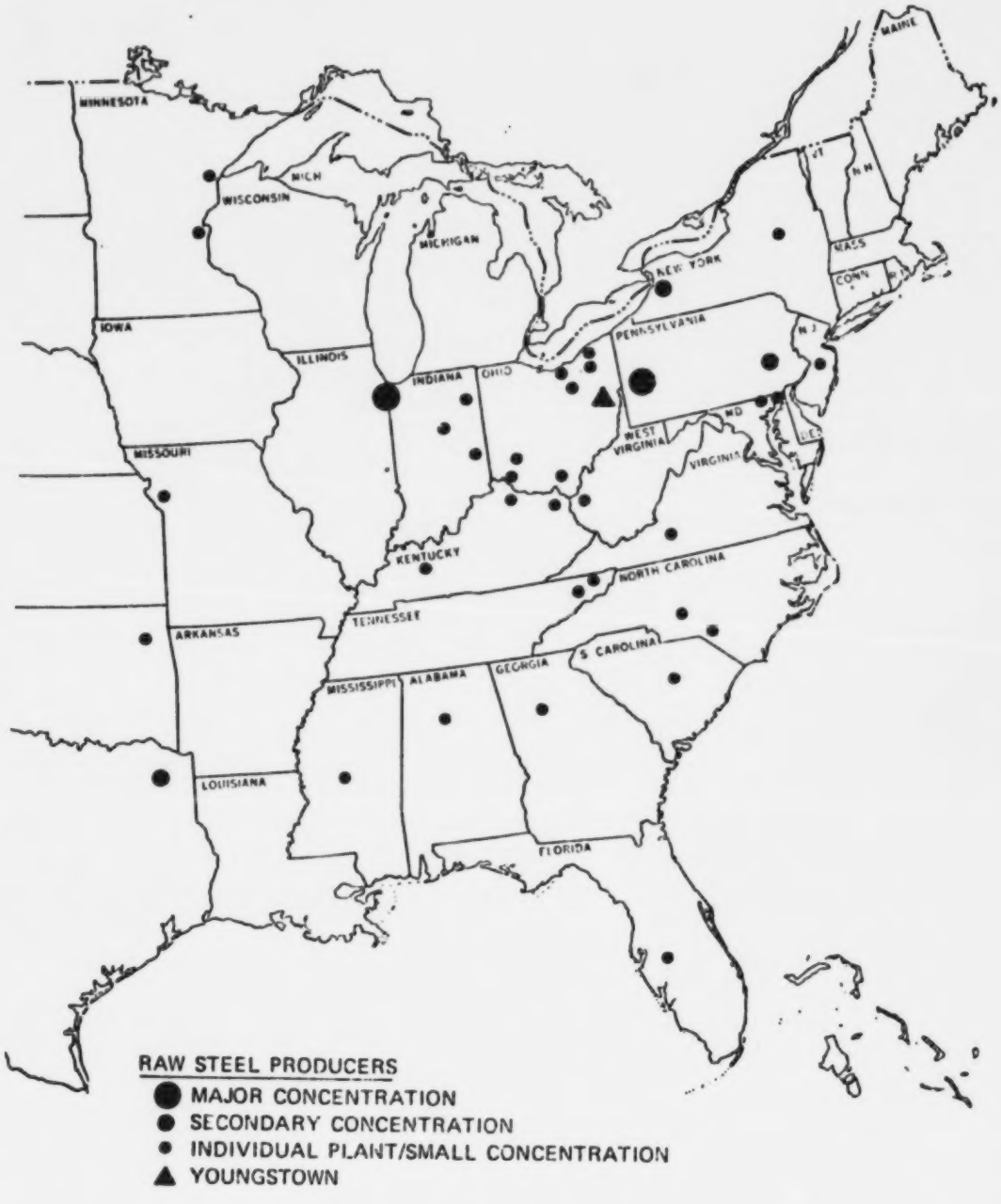
(2) Waterborne Transportation Is Not Available in the Mahoning Valley

The Mahoning River, a tributary of the Ohio River, is a small stream which is unsuitable for waterborne bulk carriers, making transshipment by rail of iron ore and limestone necessary. Both of these raw materials are shipped to Youngstown by rail after transfer from vessels at lower Great Lakes ports. This transshipment requirement contributes to high shipping and handling costs, further handicapping Youngstown compared to plants accessible to shipping.

## EXHIBIT VI

U. S. Environmental Protection Agency

# GEOGRAPHICAL RELATIONSHIP OF YOUNGSTOWN TO OTHER EASTERN STEEL CENTERS



(3) Like Other Industrial Plants, the Mahoning Valley Steel Facilities Are Subject to Curtailments of Natural Gas Supplies

The steel plants of all three companies have been affected by natural gas curtailments for over two years. These cutback have resulted from successive reductions in deliveries by three transmission companies to the East Ohio Gas Company, the utility which serves the plants. Depending on month-to-month demand and the weather, the supply to the steel plants varies. Under allotment schedules put into effect by the utility under Federal regulations, and based on the particular "profile" of gas-consuming applications in each facility, a plant receives a certain amount of gas. In early 1976, the curtailments resulted in allotments as much as 30% below consumption recorded in designated base periods, generally 1968-1969.

The outlook, reflecting the national natural gas situation, is for continued uncertain availability, with the effects on availability of the price decontrol measures now before Congress also uncertain. In the short term, however, supplies have been augmented by East Ohio's interstate spot purchase of gas, which is permitted under recent FPC rulings. This purchase, at prices much higher than the long-term contract price charged by the transmission companies, has increased the utility's current

supplies by about 10%. Other sources of gas for the steel companies, also at prices well above long-term contract prices, are the numerous independent gas drillers in Ohio. Both the utility's spot purchases of gas and potential purchases from independents by the steel companies, however, are not likely to compensate for reductions in deliveries by the transmission companies. Accordingly, the steel firms may not be able to obtain all the gas necessary to sustain operations in a period of high steel demand.

(4) The Considerable Movement of Products Between Plants Within the District Has an Unfavorable Cost Effect

All three companies studied have two or three interdependent facilities in the Mahoning Valley. This situation presumably arose from the physical limitations of individual industrial sites on the river which necessitated expansion in separate locations. While it is not uncommon in the industry to have separated ironmaking and steelmaking or primary rolling and finishing, it adds an additional cost burden that is not found in other more modern facilities.

(5) Major Expansion or Modernization of the Existing Facilities May Be Limited by Available Space

All of the steelmaking facilities in question are placed on land bounded by main highways, rivers or residential and industrial development. This situation severely inhibits the potential for expanding these facilities beyond their current boundaries.

Within most of the current plant boundaries there is some unused land as well as idle production facilities which are not likely to be reopened. While this space could be used to accommodate expansion or modernization, there are two factors which may limit the scale of such projects:

- Process flow design limitations imposed by the configuration of available space
- The cost of demolishing idle facilities to make way for modernization or expansion

* * *

This chapter has described the Mahoning Valley situation from a steel industry viewpoint. In Part II, following, findings and conclusions regarding the three companies' facilities in the region are presented.

# PART II. ANALYSIS OF COMPANY SUBMISSIONS

# I. UNITED STATES STEEL CORPORATION

This chapter presents findings and conclusions regarding the Youngstown Works of the United States Steel Corporation. Such conclusions pertain solely to the Youngstown facilities of U. S. Steel and do not necessarily reflect the opinions of the management of U. S. Steel. They have been derived on the basis of company data submissions and from discussions with U. S. Steel personnel as well as on-site observations made by members of the Booz, Allen team.

This chapter is divided into three major sections:

- Physical Characteristics
- Financial Analysis
- Conclusions

## A. PHYSICAL CHARACTERISTICS

### 1. ON-SITE INSPECTION REVEALED THAT THE FACILITIES ARE ANTIQUATED BUT WELL MAINTAINED AND EFFICIENTLY OPERATED

The consultants inspected the two facilities comprising the Youngstown Works.

- The Ohio Steel Works, which produces iron and primary rolled products from basic raw materials

- The McDonald Mills which makes a variety of finished mill products

The inspection, which included discussions with plant management and department heads, resulted in the findings presented below.

(1) The Youngstown Works Includes Some of the Oldest Steelmaking Equipment Still in Use in This Country

The Works' 4 blast furnaces and 14 open hearth furnaces are in the range of 60 to 75 years in age and are smaller than units in other U. S. Steel plants. The newest finishing mill is 40 years old with the balance of finishing equipment more than 50 years old.

(2) The Plant Is Well Scheduled and Maintained, and Staffed by a Skilled and Proficient Labor Force

The inspection tour revealed that despite its advanced age, the plant and equipment are well maintained and well scheduled. Observation of the work force produced an impression of a high level of training, experience, and efficiency.

(3) Variable Costs Are Relatively High, Mainly Due to the Age and Outdated Technology of the Works

Data submitted by the company showed that the Works' steel production costs are significantly higher than at

similarly equipped plants in other company locations. The size of the Youngstown Works' open hearth furnaces is a major contributor to this disparity.

The productivity of the Works has not changed appreciably for many years, while materials, labor, and energy cost inflation, which have not been offset by modernization, continue to worsen the variable cost picture relative to other plants where offsetting investments have been made.

2. THE PLANT LACKS COKE PRODUCTION FACILITIES AND THE FINISHING OPERATIONS ARE LOCATED SEVEN MILES FROM THE STEELMAKING AND PRIMARY ROLLING FACILITIES

The Youngstown Works is disadvantaged by the lack of a coke battery and the geographical separation of the steel manufacturing and processing facilities.

- Unlike integrated plants, the Works must receive coke from outside sources, principally the company's Clairton Works near Pittsburgh. This puts the plant at a disadvantage due to shipping and handling costs.

- Costs are also incurred due to the distance between the Ohio Works and McDonald Mills; however, the extent of material transshipment cannot be considered to be significantly different from the industry in general and so this handicap is not major.

## 3. THE ANTIQUATED STATE OF THE WORKS REFLECTS A COMPANY DECISION TO ALLOCATE AVAILABLE CAPITAL ELSEWHERE

Corporate and plant management indicate that maintenance rather than modernization expenditures have had priority for many years.

### (1) The Last Significant Modernization Project Was Completed in 1960

The sintering plant which began operating in 1960 was the last significant capital expenditure. Capital spending in the last 15 years has been confined to such small projects as mill speed controls and such maintenance-related items as blast furnace relines.

### (2) Modernization Proposals Have Not Proved To Be Competitive With Other U. S. Steel Projects

According to U. S. Steel practice, capital investment proposals are compared largely on a rate-of-return basis. The record of investment at Youngstown substantiates its non-competitive nature. In contrast, U. S. Steel has made substantial investments in plant and equipment at other facilities in recent years.

4. THE WORKS ARE OF RELATIVELY MINOR IMPORTANCE IN OVERALL COMPANY OPERATIONS AND ARE OPERATED ON A "SWING" BASIS

The production role filled by the Youngstown Works was identified in discussions with management and inspection of production records covering a number of years.

- In terms of both value and tonnage of shipments, the facilities account for less than 5% of total company steel output.
- During economic downturns the curtailment of output at Youngstown leads other U. S. Steel plants both in time and severity. During periods of strong demand, the recovery of production to normal levels at Youngstown lags behind other company units.

Under the U. S. Steel procedures for allocating output among plants, the facilities' "swing" role (use during peak production periods) is a natural consequence of their noncompetitive cost picture.

## B. FINANCIAL ANALYSIS

1. ONLY A "BEST CASE" FINANCIAL ANALYSIS WAS PREPARED ON THE PREMISE THAT IF A SIGNIFICANT NEGATIVE IMPACT WAS SHOWN UNDER FAVORABLE CONDITIONS IT WOULD BE EVEN MORE SERIOUS UNDER AVERAGE CONDITIONS

The "Best Case" analysis involved the following steps:

- The company provided operating data for July 1974, a year of record profits for the company and the month in which the Youngstown Works generated one-third of its profits for the year.

- These data were annualized to provide a base point for cash flow projections.

2. THE ADJUSTMENTS MADE TO THE JULY 1974 DATA WERE PRIMARILY CONCERNED WITH THE DEVELOPMENT OF A REPRESENTATIVE CASH FLOW FOR THE WORKS AS A "STAND-ALONE" UNIT

The company adjusted the July 1974 operating data extracted from the Works' accounting records to develop a representative cash flow for the plant as an independent operating unit. These adjustments, which were thoroughly evaluated and agreed to by the consultants, included the following:

- Inter-works shipments of raw materials and steel were raised to market prices.
- Raw material costs were adjusted to mid-1974 market prices. The most important adjustment was to the coke price--to $92/ton. A special study was conducted and U. S. Steel documentation was examined to confirm the validity of this price.
- Other small adjustments were made for:
  - Inventory changes
  - Labor cost increases granted under the existing labor contract
  - Cost increases for purchased products and services

3. THE CASH FLOW ANALYSIS WAS DERIVED BY SUPERIMPOSING THE ESTIMATED POLLUTION CONTROL INVESTMENT AND ANNUAL OPERATING COSTS ON THE "BASE POINT" OPERATING DATA

The development of a cash flow projection to reflect the plant's condition after pollution control costs are applied can be illustrated as follows:

| Item | Value | Remarks |
|---|---|---|
| Base point | + or - | Reflects pre-pollution control cash flow (after taxes). |
| Pollution control operating costs | - | |
| Interest expense | - | The cost of capital, in this case for pollution control bonds. |
| Investment tax credit | + | Applicable only in year in which investment is made. |
| Tax adjustment | + | Reflects the offsetting effect of tax deductions on pollution control costs. |
| Retirement of bonds | - | Represents the pay-back of principal to purchasers of the pollution control bonds. |
| Cash flow (after taxes) | + or - | |

A constant dollar 15-year cash flow analysis was prepared by superimposing the estimated investment and operating costs for pollution control on the "Base Point" operating data.

The cash flow projection had the following characteristics:

- The "Base Point" before pollution control indicated a positive cash flow, after taxes, of around $2 million per year.

- The pollution control investment totaled $40 million with annual costs of $10 million. The application of pollution control costs produced an average annual negative works cash flow, after taxes, of about $3 million per year.

## C. CONCLUSIONS

### 1. THE U.S. STEEL SUBMISSIONS REPRESENT A FAIR PORTRAYAL OF THE FINANCIAL IMPACT OF THE POLLUTION CONTROL INVESTMENT UPON THE YOUNGSTOWN WORKS

On the basis of a thorough review and analysis of the data submitted by U.S. Steel, extensive clarifying discussions with management, and appropriate adjustments to the data, the consultants have concluded the submissions represent a fair portrayal of the financial impact of the pollution control investment upon the Youngstown Works.

### 2. ON A "STAND-ALONE" BASIS, IT APPEARS THAT THE CASH FLOW AT THE YOUNGSTOWN WORKS DOES NOT FINANCIALLY JUSTIFY LARGE CAPITAL EXPENDITURES FOR POLLUTION CONTROL EQUIPMENT

It should be understood that the conclusions stated below are those of the consultants and do not necessarily reflect the judgment of the management of the U.S. Steel Corporation.

(1) The Long-Term Negative Cash Flow Created by Pollution Control Investment Is Likely To Be of Major Significance to the Corporation

The cash flow analysis has clearly indicated that the negative impact of the investment on this particular plant will be substantial.

Measured on a "Stand-Alone" basis, net cash flow has probably been close to zero for many years but losses were likely to have been relatively minor in relation to the corporation's overall performance. The inclusion of pollution control investment and added costs increase plant losses substantially, however, drawing further attention to its marginality.

(2) The Cash Flow Is Extremely Sensitive to Variation in Raw Materials Costs

The cost of raw materials represents a very large (and recently increasing) portion of total Works costs. Minor fluctuations in these costs can have a significant effect on the cash flow of the plant.

- Specifically, if the prices of ore and coke varied by ±5%, the cash flow impact would be of the order of around $3 million.

- Because the market price of coke is a pivotal element in the Works' operating results, sensitivity analyses were performed to test how lower coke prices, which usually are concurrent with reduced steel demand and output, would affect cash flow.

Two levels of reduced production (below July 1974 actual output) were tested using coke prices lower than those recorded in the high-output conditions of 1974. In both cases, volume-induced cost changes compensated for the lower price of coke so that operating results did not rise significantly above those of 1974, the pre-pollution control base point for the cash flows.

(3) The Economics of the Works Will Deteriorate Compared to Other U. S. Steel Plants

The analysis was prepared without taking inflationary pressures into account. Inflationary pressures will tend to have a significant negative impact upon the financial performance of the Youngstown Works because of its high operating costs, compared to more modern and more capital intensive plants.

(4) A Shutdown or Production Curtailment Decision Could Depend Upon More Than Purely Financial Considerations

In addition to the financial considerations outlined above, management can be expected to weigh several nonfinancial factors in making the pollution control investment decision. These considerations might include the following:

- Area economic and social impacts
- Contractual obligations to the labor force
- The political environment
- Market share objectives
- Customer requirements

## 3. THE POSSIBILITY OF ACHIEVING COST REDUCTIONS SUFFICIENT TO OFFSET THE POLLUTION ABATEMENT INVESTMENT APPEARS LIMITED

It does not appear that the added costs of the pollution control investment can be offset by equipment modernization.

Because of the antiquated nature of Youngstown Works, the achievement of significant cost reductions through modernization would require substantial new investments. For example, a feasible first step would be to replace the open hearth furnaces with BOF's and install a continuous slab caster. Assuming that the BOF's to be installed at the Ohio Works facilities would have an annual capacity which approximates recent high levels of the facilities' raw steel output, the capital investment required could approach $100 million, exclusive of related continuous casters.

While no pretense is made that the above investment estimate is accurate when applied to the specifics of the Ohio Works situation, it does serve to illustrate the magnitude of investment required to modernize only one element of the total antiquated production complex. With the uncompetitive position of the Youngstown Works in relation to other U. S. Steel facilities, it appears unlikely that the company would look favorably on allocating the magnitude of modernization capital required.

In summary, the following conclusions regarding U. S. Steel's Youngstown Works were drawn:

- Data submitted by the company represent a fair portrayal of the financial impact of the pollution control investment upon the Works.

- On a "Stand-Alone" basis, it appears that the cash flow of the Works does not justify the large pollution control investment.

  - Over the long term, the Works' negative cash flow after the investment is likely to be significant to U. S. Steel.

  - The cash flow is extremely sensitive to variations in raw materials costs.

  - Inflationary pressures will tend to further deteriorate the plant's financial performance, compared with other company units.

  - Management's decision regarding a shutdown or production curtailment could depend upon more than purely financial considerations.

- The antiquated nature of the Works limits the possibility of achieving cost reductions to offset the impact of the pollution control investment.

## II. YOUNGSTOWN SHEET AND TUBE COMPANY

This chapter is presented in three major sections:

- Physical Characteristics
- Financial Analysis
- Conclusions

This chapter presents findings and conclusions regarding the Youngstown District of the Youngstown Sheet and Tube Company. Such conclusions pertain solely to these facilities and do not necessarily reflect the opinion of the management of Youngstown Sheet and Tube. They have been derived on the basis of data submitted by the company and discussions with company personnel as well as on-site observations made by members of the Booz, Allen team.

### A. PHYSICAL CHARACTERISTICS

The Youngstown Sheet and Tube Company (the Company), which is one of two principal wholly-owned subsidiaries of the Lykes-Youngstown Corporation (the Corporation), manufactures and sells steel mill products.* For management purposes, the steel

*The company also is the sole or partial owner of several other operations related to its steel business. These are not in the Basic Steel Division, however, and are operated as elements of other divisions of the Lykes-Youngstown Corporation. For example, coal companies are part of the Natural Resources Division.

operations of the Lykes-Youngstown Corporation have been organized into three functional operating divisions known as the Basic Steel Division, the Natural Resources Division, and the Manufacturing and Distribution Division.

## 1. THE YOUNGSTOWN DISTRICT COMPRISES THREE SEPARATE FACILITIES

The Basic Steel Division comprises two operating districts--the Chicago District which consists of the Indiana Harbor Works in the Chicago area and the Youngstown District. The Youngstown District consists of three plants. The Campbell Works is fully integrated and produces all of the District's flat and tubular products. The Brier Hill Works produces mainly seamless pipe rounds. The Struthers plant, which has no steelmaking facilities, produces bar products.

- Together the Youngstown District plants produce less than half of the Division's tonnage but are more profitable than the Chicago District. In the last 10 years, the District has accounted for from 40% to 50% of the Division's output.

- The Youngstown District has been more profitable than the Chicago District. This is largely because the Youngstown District makes about 70% of the company's tubular products, which have higher profit margins than the flat rolled and bar products which are the mainstays of the Chicago District and because of higher fixed charges (depreciation) which must be absorbed in the Chicago District. On a cash flow basis, which does not include depreciation and which is used for allocating production, the Chicago District outperforms the Youngstown District.

2. THERE IS CONSIDERABLE INTER-PLANT AND INTER-DISTRICT PRODUCT FLOW

The plants in the Youngstown District have differing production capabilities and, therefore, have complementary roles in production. As a result, coke, hot metal, and tube rounds are shipped between District plants. In addition, the District supplies coke and seamless pipe rounds to the Chicago District.

3. MOST OF THE YOUNGSTOWN DISTRICT'S RAW MATERIALS ARE SUPPLIED BY COMPANY CONTROLLED SOURCES

Of the major raw materials used in steelmaking, coal, coke, iron ore, and scrap, only a large proportion of the scrap is purchased on the open market. More than 80% of the District's coal comes from captive sources. Most of the remainder is purchased on the spot market. More than 90% of the District's iron ore requirement is met by inter-company purchases from the Natural Resources Division.

4. SIGNIFICANT CAPITAL INVESTMENTS HAVE BEEN MADE TO MAINTAIN AND UPGRADE THE DISTRICT'S FACILITIES

From 1958 to mid-1974, the Company invested over $224 million in major capital projects in the District.

- About one-quarter of the $224 million has been invested since 1970.

- About 70% of this total was used to expand and upgrade production facilities, the remainder being for normal replacements, pollution controls ($23 million), and other projects.

In June 1974, the Corporation announced a $200 million (1974 dollars) program of expansions consisting of three main elements, which will represent incremental annual raw steel capacity of over 750 thousand tons:

- A BOF shop to replace all of the open hearth furnaces at the Campbell Works. This would be the first new steelmaking facility in the Mahoning River Valley in almost 60 years. The project would reduce steelmaking costs.

- A new 85-oven coke battery addition at the Indiana Harbor Works which will produce 2,700 tons per day and eliminate coke shipments from the Youngstown District and coke purchases.

- A new metallurgical coal mine near Waynesburg, Pennsylvania, which is expected to produce at the annual rate of 2 million tons of coal by mid-1979.

It should be noted, however, that such announcements do not entail any commitment by the Company. At the time the announcements were made, the Company noted that the realization of the projects was contingent upon profitability and funds availability. By late 1975, management had decided to postpone the BOF investment.

## 5. THE YOUNGSTOWN DISTRICT IS LIKELY TO REMAIN IMPORTANT TO THE COMPANY AND THE LYKES-YOUNGSTOWN CORPORATION

Although its share of the Division's total production has declined somewhat in recent years, the Youngstown District is likely to remain an important operating unit for the following reasons:

- It represents about 45% of the Steel Division's operations.
- The dependency of the Chicago District on supplies of tube rounds from Youngstown.
- The dependency of the Chicago District on coke production in the Youngstown District until the new Chicago coke plant is operational.
- It produces the majority of the Division's oil country tubular goods, which are partly responsible for its higher profitability compared with the Chicago District.
- It is a major supplier to two subsidiaries which are also benefiting from the increased demand for oil country tubular goods.

# B. FINANCIAL ANALYSIS

## 1. BOTH "BEST CASE" AND "AVERAGE CASE" CASH FLOW PROJECTIONS WERE PREPARED

The consultants developed four alternative base points for cash flow projections from data submitted by the company.

- The "Best Case" base point is 1974 because of its relatively high profitability on an "Integrated" (cost) basis.

- The "Average Case" base point is the average of the years 1970-1974 in which both losses and high profits were experienced.

- The "Stand-Alone" basis "Best Case" and "Average Case" base points were derived from "Integrated" basis data which were adjusted to eliminate the effect of inter-company transactions.

The data provided by the company reflects the anticipated costs and benefits of the announced major modernization plans. The effects of these projects, although not reflected in the basic cash flows developed to measure the financial impacts of the pollution control investment, were evaluated in a separate analysis performed by the consultants (see Section 6, below).

Adjustments were made to data submitted by the company in order to develop a "Stand-Alone" analysis. For example, intra-company transfers of raw materials and steel were adjusted to market prices.

The net cash flow from District operations on a "Stand-Alone" basis excluding pollution control costs was calculated to be as follows:

- "Best Case"--Approximately $24 million
- "Average Case"--Less than $1 million

2. CASH FLOW PROJECTIONS WERE DERIVED BY SUPERIMPOSING ESTIMATED POLLUTION CONTROL INVESTMENT AND ANNUAL COSTS ON THE VARIOUS BASE POINTS

The Company estimate for its pollution control costs, as adjusted by the EPA after evaluation, were as follows:

- $119 million for the initial investment
- $26 million in average before-tax incremental annual costs

Following the common methodology of the study, these costs were incorporated in a 15-year constant dollar cash flow analysis.

3. THE CASH FLOW PROJECTIONS ON THE "STAND-ALONE" BASIS YIELD CUMULATIVE CASH DEFICITS OVER THE 15-YEAR PERIOD UNDER BOTH "BEST CASE" AND "AVERAGE CASE" CONDITIONS

Pollution control costs would produce a negative cash flow under both conditions.

- Under "Best Case" conditions the cumulative deficit over a 15-year period is about $19 million.
- In the "Average Case" the cumulative deficit amounts to approximately $372 million.

The cash flow analyses include provision for the payment of capital charges on basic plant and equipment currently in place. These charges represent a cost of continuing operation as well as essential payments to assure capital access.

4. ON AN "INTEGRATED" BASIS, A POSITIVE CUMULATIVE CASH FLOW WOULD EXIST ONLY UNDER "BEST CASE" CONDITIONS

Viewed on an "Integrated" basis, cash flow becomes positive only under "Best Case" conditions.

- The "Average Case" cumulative deficit is $310 million.
- The "Best Case" cumulative positive cash flow is $92 million.

5. ON AN INTERNAL RATE-OF-RETURN BASIS, A POSITIVE RETURN IS PRODUCED ONLY UNDER "BEST CASE" CONDITIONS

If the pollution control investment is considered as a totally defensive investment purely for maintenance of production and it is assumed that current investment in the District represents non-recoverable sunk cost, an "internal rate of return" calculation can be made.

The internal rate of return method can be expected to produce a relatively high calculated return in comparison with other methods as, in essence, the entire cash flow produced by the District is balanced only against the incremental investment to maintain production and for pollution control. The results of this analysis were as follows:

- Under "Average Case" conditions, the projected return is negative in all instances.

- Under "Best Case" conditions, the projected return is less than 4% on a "Stand-Alone" basis.

- On an "Integrated" basis, assuming "Best Case" conditions, the projected return is about 24%. *

6. THE MAJOR MODERNIZATION PROJECTS ANNOUNCED BY THE COMPANY DO NOT MATERIALLY AFFECT THE CASH FLOW ANALYSES

Over a 15-year period the modernization projects announced by the Company would increase the Youngstown District's net cash flow by a total of $8 million. This amount is insufficient to materially affect the results of preceding cash flow analyses.

7. THEORETICALLY, THE INVESTMENT FUNDS REQUIRED FOR THE YOUNGSTOWN DISTRICT ALONE COULD ALMOST DOUBLE THE 1974 DEBT BURDEN OF THE YOUNGSTOWN SHEET AND TUBE COMPANY

The long-term debt of the Youngstown Sheet and Tube Company was $188 million at December 31, 1974. The $182 million investment for pollution control and major modernization at Youngstown, if supplied through debt, would represent a 97% growth in the current debt level, increasing the debt to total capitalization ratio from 21% to around 35%. On the corporate level, $182 million in borrowings would represent a 39% increase over the $465 million

*The greater return on an integrated basis is due to greater positive cash flow in the base point figure, reflecting the cost basis as opposed to market basis pricing of raw materials.

in debts outstanding at December 31, 1974 and would cause the debt to total capitalization ratio to increase from 40% to around 47%.

If the $218 million in planned modernization investment and required pollution control investment for the Chicago District is added to the equation, the Company's debt to total capitalization ratio would increase to about 46% and the Corporation's ratio to around 55%.

## C. CONCLUSIONS

### 1. THE YOUNGSTOWN SHEET AND TUBE SUBMISSIONS, AS ADJUSTED, PRESENT A FAIR PORTRAYAL OF THE FINANCIAL IMPACT OF THE POLLUTION CONTROL INVESTMENT ON THE YOUNGSTOWN DISTRICT

On the basis of a thorough review of the data and analysis submitted by the Youngstown Sheet and Tube, extensive clarifying discussions with management, and appropriate adjustments to the analysis,* the consultants have concluded that the submissions, as adjusted, present a fair portrayal of the financial impact of the pollution control investment on the Youngstown District.

*The significant adjustments made by the consultants included (1) recomputation of pollution control cost estimates (plant operating figures) on a constant dollar basis, (2) recomputation of materials costs on a market basis, and (3) recomputation of cash flows to reflect preceding adjustments.

## 2. THE INVESTMENT OF FUNDS FOR POLLUTION CONTROL AT THE YOUNGSTOWN DISTRICT DOES NOT APPEAR TO BE FINANCIALLY JUSTIFIED

Whether an investment is financially justified is normally determined in terms of the return anticipated in relation to the cost of obtaining the required capital. In the case of the Youngstown District, it appears that the return from operations after application of pollution abatement costs would not financially justify investment in pollution control.

### (1) Even Assuming "Best Case" Conditions, Pollution Control Investment in Youngstown Would Appear Financially Justified Only if the Opportunity Costs of Maintaining Operations Are Ignored

On an "Integrated" basis, a positive cash flow would be maintained under "Best Case" conditions. The internal rate of return would be close to 24% under those conditions.

On a "Stand-Alone" basis, the cumulative "Best Case" cash flow is negative. Adjusted to an internal rate-of-return basis, the cumulative cash flow would be positive at $23 million, producing a return of less than 4%, clearly less than the cost of the capital to be committed.

As is apparent, the only basis on which the investment of funds for pollution control would appear to be financially

justified would be that which would consider only the out-of-pocket costs of maintaining production under a very optimistic assumption regarding market conditions.

(2) Management Generally Would Be Likely To Base Their Decision Making on an "Average Case" Analysis

The "Best Case" analysis represents an extremely optimistic view of future steel industry performance as it is based upon the best single industry performance period in recent history. The "Average Case" analysis is based upon a five-year period which reflects the cyclical nature of steel markets and company performance. Because of this, and weighing the risks involved, management would generally be likely to base their decision making on an "Average Case" analysis.

(3) A Shutdown or Production Curtailment Decision Could Depend Upon More Than Purely Financial Considerations

Factors other than financial considerations will probably enter into a decision to close the Youngstown District facilities or to curtail their production. These possible additional factors include:

- Area economic and social impacts
- Contractual obligations to the labor force
- The political environment

- Market share objectives
- Customer requirements

## 3. THE CAPACITY OF THE YOUNGSTOWN SHEET AND TUBE COMPANY TO RAISE THE CAPITAL NEEDED TO MEET POLLUTION CONTROL REQUIREMENTS IS QUESTIONABLE

Considering both the anticipated impact of pollution control expenditures on the financial performance of the Youngstown District and the current financial position of the Youngstown Sheet and Tube Company, the capacity of the company to raise the capital needed for pollution abatement investment is questionable.

The internal cash flow of the District will not provide sufficient capital to meet investment needs. It may also be assumed that any cash generated by the Chicago District will be fully absorbed to meet its own requirements.

An equity issue would be impractical. Since the Company is a wholly-owned subsidiary of Lykes-Youngstown Corporation, any capital raised through an equity issue would be through the sale of Lykes-Youngstown Corporation's capital stock. The Corporation has not made a public stock offering in the past five years and its recent performance would not encourage an equity issue in the near future.

The Company's prospects for borrowing the funds needed for pollution abatement investment are questionable. As pointed out

above, the debt to capitalization ratios of both the Lykes-Youngstown Corporation and its subsidiary, the Youngstown Sheet and Tube Company, are high. One reason for the Corporation's position is that the Lykes Brothers Steamship Company, the other major operating unit owned by the parent, is a subsidized U.S. flag steamship operation; and in this particular industry segment relatively heavy debt is the rule rather than the exception. It was also pointed out, however, that the debt to total capitalization ratio for the Youngstown Sheet and Tube Company, as of December 31, 1974, including allocated corporate debt, was approximately 32%, a level about 45% higher than the average for domestic steel producers.

Given the major increases in debt levels implied by the borrowing requirements discussed in the preceding section of this chapter, gaining access to the required capital is likely to be a difficult prospect.

4. MAJOR MODERNIZATION EFFORTS WILL HAVE LITTLE IMPACT ON THE FINANCIAL FEASIBILITY OF POLLUTION CONTROL INVESTMENTS

While announced major modernization efforts have not been reflected in the basic cash flows, the projected costs and benefits of such expenditures were shown to be insignificant.

- The cumulative net increase of $8 million in surplus cash flows that can be attributed to the major modernization indicates that it is unrealistic to rely on these

improvements to provide sufficient cash flow to meet pollution control investment requirements.

- In addition, the planned modernization increases the need for access to funds for investment by $63 million. It is possible that this investment can be delayed, while the pollution control investment is governed by a deadline. The effects of inflation, however, will increase the amount of funds needed the longer it is put off.

* * * *

In summary, the following conclusions concerning the Youngstown District of the Youngstown Sheet and Tube Company were drawn:

- Data submitted by the Company, as adjusted, present a fair portrayal of the financial impact of the pollution control investment on the District.

- The investment does not appear to be financially justified in terms of the return from operations which could be expected after the pollution control investment.

  - Even under "Best Case" conditions, the investment would appear to be financially justified only if the opportunity costs of maintaining operations are ignored.

  - Management generally would base the investment decision on the "Average Case" analysis.

  - A shutdown or production curtailment decision could depend upon more than purely financial considerations.

- The Company's capacity to raise capital for the pollution control investment is questionable.

- The Company's announced major modernization plans will have little impact on the financial feasibility of the pollution control investment.

# III. REPUBLIC STEEL CORPORATION

This chapter presents findings and conclusions regarding the Mahoning Valley District of the Republic Steel Corporation. The conclusions pertain solely to these facilities and do not necessarily reflect the opinions of the management of the Corporation. They have been developed from data submitted by Republic Steel, discussions with the Company's management, and from on-site inspections made by members of the Booz, Allen team.

This chapter is presented in the following sections:

- Physical Characteristics
- Financial Analysis
- Conclusions

## A. PHYSICAL CHARACTERISTICS

### 1. THE MAHONING VALLEY DISTRICT COMPRISES THREE GEOGRAPHICALLY SEPARATE FACILITIES

The principal production units of Republic Steel's Mahoning Valley District are the Warren and Youngstown plants located 15 miles apart. The Warren plant is fully integrated and produces primarily sheet and strip. The Youngstown plant, which lacks steelmaking facilities, produces pipe products. The Niles plant, which

handles excess cold finishing work for another plant, is being phased out because it is underutilized. An on-site inspection of the facilities indicated that the plant and equipment were in good condition.

(1) The Two Larger Plants Are Interdependent

The Youngstown plant makes no steel. Hot metal (molten iron) is transported by rail from the Youngstown plant to the Warren plant and some is sold to two local foundries. The Youngstown plant supplies some coke to the Warren plant, which has insufficient coking capacity for its needs.

(2) The District Ships and Receives Products From Other Districts

The District rolls stainless slabs into coil for the Central Alloy District. The Warren plant rolls slabs from the Cleveland District and sends strip to the Youngstown plant for pipe production. Hot and cold rolled strip are also received from Cleveland for further processing.

The District also processes some products from or supplies intermediate products to the Manufacturing Group of the Corporation.

2. THE CHANGING MAKEUP OF THE FACILITIES WOULD APPEAR TO REFLECT A MAJOR COMMITMENT BY MANAGEMENT TO KEEP THE DISTRICT AT A PROFITABLE LEVEL

(1) Antiquated and Unprofitable Units Have Been Shut Down Over the Past Several Years

Several units used for bar production have been shut down, effectively removing the District from this business. Two pipe production units and some coating and galvanizing lines have also been taken out of operation.

(2) A New Coke Battery and Other Upgrading of Facilities Are Planned

A new coke battery is planned for installation at the Warren plant as well as a new continuous silicon anneal line. It should be noted, however, that the planned expenditures do not necessarily commit the Company to finishing these projects.

### 3. THE MAHONING VALLEY DISTRICT IS OF MAJOR SIGNIFICANCE TO OVERALL COMPANY OPERATIONS

In terms of its share of total output, uniqueness of production capability, and interplant product dependence, the District is of major significance to Republic Steel operations.

- In terms of both value and volume of shipments, the District accounts for more than 20% of total company output.
- Tubular goods produced in the District are unique to Republic's production in most respects and the volume could not be duplicated elsewhere at this time. Certain flat rolled products, although not necessarily unique, would only be produced elsewhere under conditions of considerable excess capacity with the exception of silicon cold rolled strip which would require the installation of new equipment for a duplicate production capability.
- The Warren plant provides galvanized sheet to the Manufacturing Group and also processes and sells products received from this unit.

## B. FINANCIAL ANALYSIS

### 1. THE COMPANY'S SUBMISSION MEASURED THE IMPACT OF THE POLLUTION CONTROL INVESTMENT ON RETURN ON INVESTMENT FOR AN "AVERAGE YEAR"

The Company provided District financial data for an "Average Year," which was adjusted by the consultants. These adjustments were thoroughly reviewed with management.

- The "Average Year" data were based on the years 1970 to 1974.

- "Average Year" data were provided on both a "Stand-Alone" and an "Integrated" basis.

- In addition, the Company provided at the consultants' request a detailed analysis of the District's operations for 1972, which was found to be comparable in most respects to the "Average Year" data.

2. ADDITIONAL ESTIMATES WERE MADE BY THE CONSULTANTS TO ASSIST IN THE EVALUATION OF THE SUBMISSION

The consultants prepared estimates of 1974 operating results on a "Stand-Alone" basis in order to establish an appropriate range of performance and to incorporate some of the more recent inflationary factors into the analysis.

- A "Best Case" was developed by the consultants using estimated 1974 operating data. Major cost elements were adjusted from 1972 actual figures to 1974 levels on the basis of Company, BLS, and American Iron and Steel Institute data.

- The "Best Case" estimates indicate that steel production in 1974 was generating a relatively high level of profit. Tubular goods volume, an overall improvement in product mix and steel price increases obtained in 1974 were largely responsible for this performance.

3. CASH FLOW ANALYSES PREPARED BY THE CONSULTANTS WERE DERIVED BY SUPERIMPOSING THE POLLUTION CONTROL INVESTMENT AND ANNUAL OPERATING COST REQUIREMENTS ON THE VARIOUS BASE POINTS

Pollution control investment and annual cost estimates were derived from Company submissions. Investment costs provided by

the Company, as adjusted after evaluation by the EPA, were $140 million to meet 1977 requirements and an estimated $25 million to meet 1983 needs. Incremental annual costs (excluding depreciation) were estimated to peak at $24 million.

Excluding pollution control costs, the District's average annual cash flows computed under various conditions were as follows:

- "Best Case" on a "Stand-Alone" Basis--Approximately $21 million
- "Average Case" on a "Stand-Alone" Basis--Approximately a negative $3 million
- "Average Case" on an "Integrated" Basis--Approximately $7 million

With pollution control costs included, the following average annual cash flows were derived:

- "Best Case" on a "Stand-Alone" Basis--Approximately $5 million
- "Average Case" on a "Stand-Alone" Basis--Approximately a negative $18 million
- "Average Case" on an "Integrated" Basis--Approximately a negative $8 million

Analysis on an internal rate-of-return basis yields the following results:

- Under "Average Case" conditions, the projected return is negative in all instances.

- Under "Best Case" conditions, the projected return is approximately 15% on a "Stand-Alone" basis.

- On an "Integrated" basis assuming "Best Case" conditions, the projected return would probably exceed 20%

## 4. THE FINANCING OF POLLUTION CONTROL INVESTMENTS AND ANNOUNCED CAPITAL PROJECTS COULD DOUBLE THE COMPANY'S PROPORTION OF DEBT TO TOTAL CAPITAL

Republic Steel has relied on debt as its sole source of external capital for at least the past decade. The most recent debt offerings by the Company were a series of pollution control revenue bond issues totalling $105 million which went to the market this year.

Considering the Company's position at the end of 1974, the following should be noted:

- At the end of 1974, the Company had total long-term debt outstanding of approximately $266 million for a ratio of long-term debt to total capitalization of 17%, which is somewhat lower than the steel industry average of 22%.

- Total capital expenditures for the Company over the next five years may total about $1.5 billion including pollution control investment, announced expansion and modernization programs, and investment to maintain existing plant and equipment.

- Excess cash generated by the Company could vary between $350 and $850 million over the next five years, depending on whether "Best Case" or "Average Case" conditions are assumed.

Under "Average Case" conditions, and assuming that capital needs not supplied by internally generated cash must be met by long-term borrowing, the Company's debt to total capitalization ratio could increase to around 50% if all planned and mandated capital expenditures were to be made.

## C. CONCLUSIONS

### 1. THE DATA SUBMITTED BY REPUBLIC STEEL, ALONG WITH ANALYSES PREPARED BY THE CONSULTANTS, PRESENT A FAIR PORTRAYAL OF THE FINANCIAL IMPACT OF THE POLLUTION CONTROL INVESTMENT ON THE MAHONING VALLEY DISTRICT

Republic Steel did not prepare cash flow submittals. The firm did provide pollution control cost estimates and operating data which were used by the consultants to prepare "Average" and "Best" Case cash flow computations. On the basis of the data provided by the Company, the analysis performed by the consultants, and extensive discussions and reviews with the management of Republic Steel, the consultants have concluded that a fair portrayal has been developed of the financial impacts of the pollution control investment on the Mahoning Valley District.

2. THE INVESTMENT OF FUNDS FOR POLLUTION CONTROL AT THE MAHONING VALLEY DISTRICT DOES NOT APPEAR TO BE FINANCIALLY JUSTIFIED

Under "Average Case" conditions on both a "Stand-Alone" and an "Integrated" basis, pollution abatement costs would produce net negative cash flows. Under "Best Case" conditions on a "Stand-Alone" basis, the investment would generate a return of around 15% calculated on a defensive basis (internal rate of return).

Management would be likely to base decisions on an "Average Case" analysis in view of the risks inherent in the investment and the cyclical nature of steel industry profits over the long term. Management can also be expected to weigh nonfinancial factors, such as area economic, and social impacts, in making the pollution control investment decision.

3. THE POSSIBILITY OF ACHIEVING COST REDUCTIONS SUFFICIENT TO OFFSET POLLUTION ABATEMENT COSTS APPEARS LIMITED

Most investments to improve cost performance appear to have been made and selected unprofitable production lines have been shut down. The remaining cost handicaps are due to locational constraints, and some major facilities' layout problems which would require extensive capital investment for plant reconstruction to eliminate.

## 4. THE CAPACITY OF THE REPUBLIC STEEL CORPORATION TO RAISE THE CAPITAL NEEDED TO MEET POLLUTION CONTROL REQUIREMENTS AND PROVIDE FOR OTHER PLANNED INVESTMENTS IS QUESTIONABLE

As indicated in the preceding section of this chapter, to meet all capital needs over the next five years the Company would be forced to borrow to a point where its debt to total capitalization ratio would be about 50%. Financial analysts generally regard the debt ceiling for a prudently managed steel producer to reflect roughly a 30% ratio. Accordingly, it is probable that the Company would be forced to make major tradeoffs between pollution control investments and revenue producing investments. In view of the preceding cash flow analyses it does not appear that the investment of funds for pollution control in the Mahoning Valley District would stand up well in a tradeoff analysis based on economic criteria.

* * * *

In summary, the following conclusions concerning Republic Steel's Mahoning Valley District were drawn:

- The data submitted by the Company, along with analyses prepared by the consultants, present a fair portrayal of the financial impact of the pollution control investment on the District.
- The investment of funds for pollution control does not appear to be financially justified.

- The possibility of achieving cost reductions to offset pollution control cost appears limited.

- Republic Steel's capacity to raise capital to meet pollution control requirements and to provide for other planned investments is questionable.